

Serial No. 10/561,975
Reply to Office Action dated June 23, 2009

Docket No. 1006/0117PUS1

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) An apparatus for heat exchange, comprising having at least three flow devices through which at least one flowable medium ~~(fluid)~~ flows;

at least one fluid inflow device, at least one fluid collection ~~and/or~~ or distribution device and at least one fluid outflow device for each of the flow devices through which substantially liquid fluids flow; and [,.]

~~wherein~~ at least two flow assemblies ~~are provided~~, each having at least two flow elements which are arranged in such a manner that different fluids flow through them alternately, the at least two flow elements each comprising a front, a rear and first and second sides bounding a generally planar surface, the flow elements belonging to at least one flow device through which substantially liquid fluids flow are connected in a substantially gastight and liquid-tight, positively locking ~~and/or~~ or nonpositively locking ~~and/or~~ or cohesive manner to at least one fluid collection ~~and/or~~ or distribution device,

wherein the main directions of flow of all the fluids in the flow elements lie in planes that are substantially parallel to one another, and

wherein at least two flow assemblies are directly connected in series in a positively locking ~~and/or~~ or nonpositively locking ~~and/or~~ or cohesive manner ~~and/or~~ or flow-connected by means of fluid distribution devices, at least with respect to one flow

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device.

2. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

the flow elements, at least in sections, are formed by ~~in particular, although not exclusively,~~ hollow disks, flat tubes, plates, layers and the like.

3. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

at least one fluid collection ~~and/or~~ or distribution device is formed at least in sections ~~in particular, although not exclusively,~~ by hollow bodies and/or tubes.

4. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

at least one fluid collection ~~and/or~~ or distribution device is formed at least in part from longitudinal-side openings in the flow elements, a first number of simple openings forming fluid inlets and fluid outlets with respect to adjacent flow elements, and sealing devices being arranged around a second number of openings, in order to form passages in the corresponding flow element, through which passages flow elements adjacent to this flow element are flow-connected.

5. (Currently Amended) ~~An apparatus, in particular the apparatus as claimed in claim 1,~~ An apparatus for heat exchange, comprising:

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at least three flow devices through which at least one flowable medium flows;
at least one fluid inflow device, at least one fluid collection or distribution device
and at least one fluid outflow device for each of the flow devices through which
substantially liquid fluids flow; and

at least two flow assemblies, each having at least two flow elements, which are
arranged in such a manner that different fluids flow through them alternately, the flow
elements belonging to at least one flow device through which substantially liquid fluids
flow are connected in a substantially gastight and liquid-tight, positively locking or
nonpositively locking or cohesive manner to at least one fluid collection or distribution
device,

wherein the main directions of flow of all the fluids in the flow elements lie in
planes that are substantially parallel to one another,

wherein at least two flow assemblies are directly connected in series in a
positively locking or nonpositively locking or cohesive manner or flow-connected by
means of fluid distribution devices, at least with respect to one flow device, and

wherein turbulence-generating and/or turbulence-increasing shaped elements
are provided.

6. (Currently Amended) An apparatus, ~~in particular the apparatus as claimed in~~
~~claim 4 claim 5~~, wherein

the turbulence-generating ~~and/or or~~ turbulence-increasing shaped elements are
taken from a group consisting of ~~which includes in particular, although not exclusively,~~
fins, webs, studs, grooves, stamped indentations ~~[[or]]~~ and milled-out sections.

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7. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in ~~claim 4~~ claim 5, wherein

the turbulence-generating ~~and/or~~ or turbulence-increasing shaped elements are arranged in at least one flow element ~~and/or~~ or between at least two flow elements.

8. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

the profile of at least one flow element has turbulence-generating ~~and/or~~ or turbulence-increasing properties.

9. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

at least two flow elements through which different fluids flow are connected on the longitudinal sides in a positively locking ~~and/or~~ or nonpositively locking ~~and/or~~ or cohesive manner.

10. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

at least two flow elements through which the same fluid flows are connected on the longitudinal sides by means of ~~in particular, although not exclusively,~~ the turbulence-generating and turbulence-increasing shaped elements which have their own profile ~~and/or~~ or are arranged between them, in such a manner that the at least

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one cavity which is thereby formed between these flow elements forms a flow element for a different fluid.

11. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

the joins between the flow elements are taken from a group ~~which includes~~ consisting of soldered joins, welded joins ~~[[or]]~~ and adhesively bonded joins.

12. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

at least one sealing element, which is formed ~~in particular, although not exclusively,~~ by separating elements, blind elements ~~and/or~~ or hollow elements which are empty of fluid, is provided between at least two flow elements through which different fluids flow.

13. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in ~~claim 1~~ claim 12, wherein

at least one of the sealing elements is arranged between at least two flow assemblies.

14. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

at least one of the sealing elements has ~~in particular, although not exclusively,~~ a

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hollow element which is empty of fluid, a leaktightness control opening.

15. (Currently Amended) ~~An apparatus, in particular the apparatus as claimed in claim 1~~ claim 12, wherein

at least one of the sealing elements has at least one leaktightness sensor, which causes a physically perceptible signal to be output in the event of a fluid escaping from one of the flow devices.

16. (Currently Amended) ~~An apparatus, in particular the apparatus as claimed in claim 1~~, wherein

at least two flow assemblies are separated from one another in a substantially thermally insulating way, ~~in particular, although not exclusively,~~ by hollow elements ~~and/or~~ or separating elements or by being arranged spaced apart.

17. (Currently Amended) ~~An apparatus, in particular the apparatus as claimed in claim 1~~, wherein

shaped elements are provided within at least one flow element, which shaped elements, at least in sections, alter the main direction of flow of the fluid flowing within the flow element.

18. (Currently Amended) ~~An apparatus, in particular the apparatus as claimed in claim 1~~ An apparatus for heat exchange, having

at least three flow devices through which at least one flowable medium (fluid)

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flows:

at least one fluid inflow device, at least one fluid collection and/or distribution device and at least one fluid outflow device for each of the flow devices through which substantially liquid fluids flow,

wherein at least two flow assemblies are provided, each having at least two flow elements, which are arranged in such a manner that different fluids flow through them alternately,

the flow elements belonging to at least one flow device through which substantially liquid fluids flow are connected in a substantially gastight and liquid-tight, positively locking and/or nonpositively locking and/or cohesive manner to at least one fluid collection and/or distribution device,

the main directions of flow of all the fluids in the flow elements lie in planes that are substantially parallel to one another,

at least two flow assemblies are directly connected in series in a positively locking and/or nonpositively locking and/or cohesive manner and/or flow-connected by means of fluid distribution devices, at least with respect to one flow device,

wherein

at least one flow device has admixed with it, via at least one further inflow device, ~~a fluid, in particular, although not exclusively,~~ a fluid which corresponds to the fluid in this flow device.

19. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

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the series connection according to the invention of at least two flow assemblies with respect to at least one flow device is effected in such a manner that the temperature gradient of the fluid of this flow device along the flow path of this fluid from the fluid inflow device to the fluid outflow device of this flow device has a substantially constantly decreasing magnitude with respect to each of the other fluids flowing through the flow assemblies of the flow assembly series connection.

20. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

fluids are mixed in the heat exchanger, it being possible for different proportions of the overall fluid to flow through different flow elements.

21. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

a fluid is divided in the heat exchanger, ~~it being possible for~~ such that different proportions of the divided fluid ~~[[to]]~~ flow through different flow elements.

22. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

in individual flow assemblies the heat is exchanged by condensation or evaporation of a fluid.

23. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in

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claim 1, wherein

the individual flow assemblies can be operated as crosscurrent, countercurrent or cocurrent heat exchange units.

24. (Currently Amended) An ~~apparatus, in particular the~~ apparatus as claimed in claim 1, wherein

the heat exchanger is part of a cooling circuit, and the individual flow assemblies are supplied with the fluid from a further low-temperature ~~and/or~~ or high-temperature cooling circuit.

Claims 25 and 26 (Cancelled).

27. (New) An apparatus for heat exchange, comprising:

first, second and third flow devices defining first, second and third flow paths for maintain first, second and third separate flows of at least one fluid, each of said flow devices having a front, a rear and first and second sides, each of said flow devices including a fluid inflow device, a plurality of fluid distribution trays each having a substantially planar wall between said front and rear and between said first and second sides, and a fluid outflow device,

the apparatus including a first flow assembly comprising a first subset of the plurality of first flow device distribution trays interleaved with the plurality of second flow device distribution trays and a second flow assembly comprising a second subset of the plurality of first flow device distribution trays interleaved with the third flow device

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distribution trays, the first flow path beginning in said first flow assembly and ending in the second flow assembly, the second flow assembly beginning and ending in the first flow assembly and the third flow path beginning and ending in the third flow assembly; and

the distribution trays of the first flow device being connected in a substantially gastight and liquid-tight manner to the distribution trays of the second flow device and to the distribution trays of the third flow device,

wherein said distribution trays are stacked such that said planar walls are mutually parallel.

28. (New) An apparatus as claimed in claim 27 wherein a subset of the plurality mutually parallel walls include projections or depressions configured to alter the flow of the fluid along the walls.